Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the matter of	)	
	)	
Interference Immunity Performance Specifications for Radio Receivers	)	ET Docket No. 03-65
	)	

REPLY COMMENTS OF INMARSAT VENTURES PLC

Inmarsat Ventures plc ("Inmarsat") hereby replies to the comments submitted on the Commission's Notice of Inquiry[1] in this proceeding. In particular, Inmarsat takes this opportunity to clarify the record with regard to the comments filed by Mobile Satellite Ventures Subsidiary LCC ("MSV"), which is using this proceeding in an attempt to circumvent certain interference protections that the Commission established in its order[2] in the *ATC Proceeding*.[3] Imposition of receiver standards in the L-band would serve to stifle innovation and is unnecessary in light of the competitive and economic incentives inherent in the satellite industry. For the reasons discussed below, Inmarsat urges the Commission to refrain from adopting satellite receiver standards in the L-band.

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1 *See Interference Immunity Performance Specifications for Radio Receives, Notice of Inquiry*, ET Docket No. 03-65 ("*NOI*") (March 24, 2003)

2 *See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, Report and Order*, 18 FCC Rcd 1962, FCC 03-15, IB Docket 01-185 (February 10, 2003) ("*ATC Order*").

3 *See In the Matter of Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands; Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands*, IB Docket No. 01-185, IB Docket No. 02-364 (the "*ATC Proceeding*").

BACKGROUND

Inmarsat is the owner and operator of a geostationary orbit mobile satellite service ("MSS") system that provides service at the L-band throughout the world, including the United States. Inmarsat provides maritime communications services to ships, aeronautical communications services to commercial and private planes, and terrestrial communications services to numerous customers including farmers, news organizations, and emergency relief organizations. In addition, Inmarsat's services are used for a variety of navigation and safety services such as the Global Maritime Distress and Safety System.

Inmarsat currently has two generations of satellites in orbit, Inmarsat-2 and Inmarsat-3, and has coordinated the use of L-band spectrum between 1525-1559 MHz and 1626.5-1660.5 MHz. Demand for Inmarsat's services continues to grow both inside the United States and around the world. To accommodate this demand and to offer improved service and capabilities to its customers, Inmarsat is developing and deploying a next generation satellite, Inmarsat-4, at an expense of over $1.5 billion. Inmarsat expects to launch two Inmarsat-4 satellites within the next two years.

DISCUSSION

I. Imposition Of Receiver Standards Would Stifle Innovation And New Products

As a successful MSS operator, Inmarsat has worked to provide the best possible products and services to consumers. This includes constant innovation and development of its existing and next generation systems. In developing its MSS system, Inmarsat has designed, and will continue to design, a network that provides efficient MSS service while meeting the needs and demands of its customers. As the Satellite Industry Association ("SIA") has stated "satellite operators have every incentive to deploy systems that are resistant to interference and use

spectrum as efficiently as possible. The nature of the satellite business makes it essential that satellite network designs maximize the performance possible from the limited power, spectrum and orbital resources available."[4]

Commenters have noted, however, that there are at times a tension between system functionality and sensitivity to interference.[5] For example, higher order modulation techniques and higher satellite antenna gains lead to better spectrum efficiency but also make the system more sensitive to interference because of the higher carrier-to-noise ratio requirements and susceptibility to receiving signals from unwanted sources, respectively. Similarly, answering consumer demand for smaller, lower cost, higher data-rate earth terminals with a longer battery life has led to the production of lower power terminals that are more interference sensitive. As the Commission itself has noted, system advances can lead to technology that is advantageous to users but also more vulnerable to interference issues.[6]

The imposition of receiver standards in the L-band would place an artificial obstacle in the path of satellite system operators and equipment manufactures as they attempt to meet the changing demands of consumers. The Commission is appropriately concerned with stifling innovation.[7] The imposition of receiver standards would have just this effect and should

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4 Comments of the Satellite Industry Association at 2 ("SIA Comments").

5 *See, e.g.,* SIA Comments at 5; Comments of Nokia, Inc. at 1-2.

6 *See, e.g., NOI* at ¶ 13.

7 *See NOI* at ¶ 2 (The Commission has recognized "mandatory standards could also stifle innovation be restricting the introduction of products with otherwise desirable new features that are inconsistent with the standards.").

be avoided. Consistent with the majority of commenters in the proceeding, Inmarsat urges the Commission not to impose receiver standards.[8]

II. MSV Attempts To Use This Proceeding To Circumvent The Commission's Decision In The *ATC Proceeding*

Standing apart from the rest of the satellite industry, MSV advocates for receiver standards.[9] MSV readily admits that its purpose for advocating for receiver standards in the L-band is to advance MSV's deployment of an ancillary terrestrial component ("ATC") system,[10] a non-conforming terrestrial use that is not contemplated by the international table of frequency allocations. MSV's comments, while ostensibly responsive to the *NOI*, quickly devolve into a rehashing of arguments about the level of protection that Inmarsat mobile earth terminals should receive from ATC operations.

The issues raised by MSV in its comments have been the subject of debate and consideration in the *ATC Proceeding* for over two years and were addressed in the Commission's *ATC Order*.[11] Both parties have requested that the Commission reconsider the mobile earth

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8 *See, e.g.,* SIA Comments at 6; Comments of the Cellular Telecommunications & Internet Association at 1-2 ("while receiver performance requirements can provide spectrum utilization efficiencies, such requirements can also undercut the effectiveness of competitive market forces"); Comments of the Telecommunication Industry Association at 3-4; Comments of Ericsson, Inc. at 13 ("any new regulatory mandate . . . is likely to stifle innovation, increase the cost of products for consumers, and reduce the variety of choices presently available to consumers without a corresponding benefit"); Comments of PanAmSat Corporation at 4-5.

9 *See* Comments of Mobile Satellite Ventures Subsidiary LLC at 1 ("MSV Comments").

10 *See id.* at 6.

11 *See ATC Order* at ¶¶ 151-54.

terminal interference limits adopted in the *ATC Order* and the record continues to be developed in the *ATC Proceeding*.[12]

The Commission recognized in the *ATC Order* the need to protect Inmarsat's MSS operations from the deployment of an ATC system in the L-band. Inmarsat provided the Commission with an analysis of how the ATC system proposed by MSV would harm Inmarsat's existing and future MSS operations. While MSV has stylized this behavior as "anticompetitive,"[13] the Commission, recognizing the potential for unacceptable interference, has determined that it is appropriate to protect Inmarsat and users of Inmarsat's MSS system.[14]

MSV should not be allowed to use this proceeding to impose restrictions on Inmarsat's mobile earth terminals that the Commission recognized as insufficient to protect Inmarsat's system in the *ATC Proceeding*. The resolution of interference issues related to receivers in the L-band should be made by the Commission in the *ATC Proceeding*, where Inmarsat and MSV have filed, and continue to submit, substantial technical analyses regarding the interference that ATC will cause Inmarsat.[15] Nevertheless, for the sake of completeness, Inmarsat addresses MSV's comments below.

MSV's proposed imposition of a "best practices" standard would limit the current and future MSS offerings available in the L-band for the benefit of ATC deployment. MSV, as

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12 *See* Inmarsat Petition for Reconsideration and Clarification, IB Docket No. 01-185 (filed July 7, 2003) ("*Inmarsat Petition*"); MSV Petition for Partial Reconsideration and Clarification, IB Docket no. 01-185 (filed July 7, 2003) ("*MSV Petition*").

13 *See* MSV Comments at 6. It is misleading of MSV to assert that "[o]f the three providers of MSS in the L-band, only [Inmarsat] opposed the authorization of ATC." *Id.* at 2; *see also* 5-6. Besides Inmarsat, in the U.S., the only L-band providers are MSV – who intends to deploy ATC – and TMI, one of primary owners of MSV whose spectrum will be used by MSV or MSV Canada in their U.S. and Canadian operations.

14 *See ATC Order* at ¶¶ 152-54.

15 *See, e.g., Inmarsat Petition* at Exhibits A and B; *MSV Petition* at Appendix C.

demonstrated by its proposals in the *MSV Petition*, is quite willing to cannibalize its own MSS system for the sake of expanding its proposed ATC operations. MSV proposed "best practice" receiver standards that would result in mobile earth terminals that are highly undesirable commercially for satellite use but that would allow MSV much greater ATC flexibility. As discussed above, increased system/receiver functionality needs to be balanced with interference sensitivity. Sensitivity to interference should not be the gating standard used to determine what best serves MSS customers and operators in the L-band.

Moreover, as other commenters have recognized, receiver standards should not be imposed on existing service operators for the benefit of operators of a new service.[16] Nokia, Inc. aptly explains that:

> Given that incumbents shoulder the burden of improved receiver performance, in terms of cost and impact on system performance, any benefits of increased capacity should accrue to existing spectrum users who have made this additional capacity possible through their investments. In the case of licensed spectrum, the Commission should not allow new systems to take advantage of the additional capacity, particularly any introduced through an "underlay" or easement on the licensees' rights. Allowing more underlay users, and therefore reduced capacity for the licensee in its own band, amounts to a market distortion whereby the government creates economic disincentives for exiting users to maximize spectrum efficiency.[17]

In the L-band, the Commission should not adopt receivers standards that (i) are unrelated to the improvement of MSS service and (ii) could stifle innovation and development of future MSS services for the benefit of ATC – a new non-conforming terrestrial service. Such a result would harm MSS operators in the L-band and create an undesirable precedent for other satellite bands.

Finally, although more fully addressed in the *ATC Proceeding*, Inmarsat feels compelled to respond briefly to the attacks MSV made on Inmarsat's overload threshold

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16 *See, e.g.,* Comments of Nokia, Inc. at 4; Comments of Motorola, Inc. at 5-6.

17 *See* Comments of Nokia, Inc. at 4; *see also* Comments of Motorola, Inc. at 5-6.

analysis. Inmarsat disagrees with MSV's characterization of Inmarsat's recent showing.[18] In its petition for reconsideration in the *ATC Proceeding*, Inmarsat filed analyses conducted by two manufacturers of Inmarsat mobile terminals, NERA and Honeywell. Those studies demonstrate that a threshold of at most –75 dBm is necessary to protect Inmarsat mobile earth terminals from interference resulting from out-of-band signals that would be transmitted by the proposed ATC base stations.[19] Specifically, NERA's analysis determined that the appropriate overload threshold for Inmarsat's latest and fastest growing MET, the Inmarsat Global Area Network ("GAN") terminal, is –75 dBm.[20] For Inmarsat's aeronautical terminals, the Honeywell report demonstrates that (i) the overload threshold is –72 dBm at 1 MHz frequency offset, and (ii) for offsets less than 1 MHz, the overload level is even lower.[21]

In the guise of advocating that the Commission require a certain level of detail in substantiating overload threshold levels, MSV substantively challenges certain aspect of the NERA report.[22] MSV's attacks, however, are unfounded. NERA provides a complete and detailed analysis that is more than sufficient to establish the overload threshold applicable to the GAN terminal. Contrary to MSV's accusations, NERA describes its measurement procedures[23] and properly indicates that the overload threshold is referenced to the input of the receiver front-

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18 *See* MSV Comments at 8 and fn. 11. Inmarsat's recent test data submitted in the *ATC Proceeding* demonstrates that overload susceptibility is, among other things, a function of the frequency offset of the interfering signal and that MSV's asserted values are wrong.

19 *See Inmarsat Petition* at 15-17.

20 *See id.* at Ex. A.

21 *See id.* at Ex. B.

22 *See* MSV Comments at 8 (MSV states four reasons for claiming that the NERA tests are incomplete).

23 *See Inmarsat Petition* at Ex. A §§ 3.2.2. and 3.2.3.

end.[24] NERA also provides a description of the general bit error rate[25] and discusses the specific bit error rate used to determine the threshold.[26]

MSV also promotes it own analysis of the overload threshold of Inmarsat terminals.[27] As will be explained more fully in the forthcoming Inmarsat reply to the *MSV Petition* in the *ATC Proceeding*, MSV's analysis is flawed in several respects, including that it ignores: (i) the effect that an interfering signal will have on the demodulation of a wanted signal; (ii) the generation of harmonic signals and the resulting intermodulation effects created by non-linearities when applying more than just one signal at the receiver input; (iii) the degradation effects that will be suffered by the elements that are further down the receiver chain such as A/D converter, amplifiers, downconverters and filters; and (iv) the increased composite power level applied to the A/D converter.

The analysis of the specific overload threshold protections necessary to protect Inmarsat's mobile earth terminals from ATC interference is the subject of an on-going review in

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24 *See id.* at Ex. A § 3.2.2. With reference to Figure 3.2.2, the vector analyzer block is used to calibrate C/No (as described in bullet 2 of the test procedure), and the IBM PC logs BER based on the terminal's calculation of bit errors since the sent data sequence is known *a priori*. The latter is described in bullet 3. Bullet 4 then explains that the level of the interfering signal (block named GSM) is increased until harmful degradation is experienced. Hence the referencing between overload threshold and the input level is apparent.

25 *See id.* at Ex. A. The general bit error rate of the GAN service is dependent on a number of factors such as GAN system design and actual link conditions (including power levels configured in the network). GAN system definition and operation is based on link budgets that defines a required C/No of 53.2 dBHz at the terminal to provide BER < 10^{-6}. It is clearly described how this C/No value is calibrated, thereby producing a near-zero BER (<10^{-6}).

26 *See id.* at Ex. A § 3.2.2. NERA measured the level when bit errors starts to occur, *i.e.* when going from the state of a near zero BER to the state of experiencing frequent bit errors real time (BER >> 10^{-6}). The GAN demodulator is based on turbo decoding which is characterized by a steep BER degradation curve, so the described method is adequate to determine the level of harmful interference.

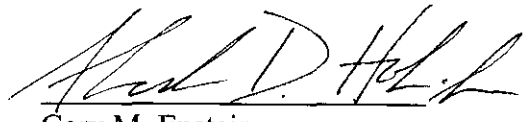
27 *See* MSV Comments at 3.

the *ATC Proceeding* and is best handled there. MSV should not be permitted to circumvent the Commission's findings on this matter by advocating for the imposition of receiver standards in this proceeding.

CONCLUSION

For the reasons discussed above, Inmarsat urges the Commission to refrain from adopting receiver standards in the L-band.

Respectfully submitted,



Gary M. Epstein
John P. Janka
Alexander D. Hoehn-Saric
LATHAM & WATKINS LLP
555 11th Street, N.W.
Suite 1000
Washington, D.C. 20004
(202) 637-2200 (phone)
(202) 637-2201 (fax)

Counsel for INMARSAT VENTURES PLC

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